# Management of Asthma exacerbation in pediatrics

(Emergency Department Management)

Tehran,21<sup>th</sup> May 2020



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# Exacerbation

Still, despite advances in asthma management, asthma exacerbations in children remain a major issue. They can cause significant morbidity and mortality in patients.



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# Asthma exacerbations **Definition**

acute or subacute worsening of symptoms and progressive decrease in lung function compared with the patient's normal status, and requiring a change in treatment or hospitalization.



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# Asthma exacerbations other terms

The terms 'episodes', 'attacks' and 'acute severe asthma' are also often used, but they have variable meanings .

> The term ' **Flare-up**' is preferable for use in discussions with most patients.`



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# Asthma exacerbation **Common Triggers**

- Viral respiratory infections
- Allergen exposure e.g. grass pollen, fungal spores, ...
- Food allergy
- Outdoor air pollution
- Seasonal changes and/or returning to school in fall (autumn)
- Poor adherence with ICS



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#### **Remember:**

✓ a subset of patients present more acutely and without exposure to known risk factors

#### Severe exacerbations can occur in patients with mild or well-controlled asthma symptoms.

## **Asthma exacerbation**



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## Asthma exacerbation Identifying patients at risk of asthma-related death

- A history of near-fatal asthma requiring intubation and MV
- Hospitalization or emergency care visit for asthma in the past year
- Currently using or having recently stopped using oral corticosteroids
- Not currently using inhaled corticosteroids
- Over-use of SABAs, especially use of more than one canister of salbutamol monthly
- Poor adherence with ICS-containing medications
- poor adherence with (or lack of) a written asthma action plan
- A history of psychiatric disease or psychosocial problems
- Food allergy in a patient with asthma
- Several comorbidities including pneumonia, diabetes and arrhythmias



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# Management of Asthma exacerbation



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#### Management of Asthma exacerbation **Different Protocols**

significant variability in recommendations for the diagnostic and therapeutic management of asthma exacerbations in the pediatric population



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# Suggested to be read



EUROPEAN RESPIRATORY REVIEW REVIEW S. MANTI ET AL.

Management of asthma exacerbations in the paediatric population: a systematic review

Sara Manti <sup>1,3</sup>, Amelia Licari <sup>2,3</sup>, Salvatore Leonardi<sup>1</sup> and Gian Luigi Marseglia <sup>2</sup>

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History Physical examination Objective assessments



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# History

#### **Physical examination**

level of Consciousness, degree of Agitation , pulse rate, respiratory rate, ability to complete sentences, use of accessory muscles, wheeze, respiratory pattern

#### **Objective assessments**



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- Measurement of lung function
- Oxygen saturation
- Arterial blood gas measurements are not routinely required
- Chest X-ray (CXR) is not routinely recommended



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#### **Physical examination should assess:**

#### Complicating factors

(e.g. anaphylaxis, pneumonia, atelectasis, pneumothorax or pneumomediastinum)

#### • Signs of alternative conditions that could explain acute breathlessness

(e.g. cardiac failure, inducible laryngeal obstruction, inhaled foreign body or pulmonary embolism)



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#### great variability in the definition of disease severity

(it doesn't seem possible to extract a unique definition of asthma exacerbation severity)



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- Adults, adolescents, children 6–11 years
- Children 5 years and younger

# **UpToDate**<sup>®</sup>

Acute asthma exacerbations in children younger than 12 years: Emergency

#### department management

Author: <u>Richard J Scarfone\_MD\_FAAP</u> Section Editors: <u>Gregory Redding\_MD</u>, <u>Stephen J Teach\_MD\_MPH</u> Deputy Editor: <u>Elizabeth TePas\_MD\_MS</u>





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ASTHM® Initial assessment of acute asthma exacerbations in children 5 years and younger

Symptoms	Mild	Severe'
Altered consciousness	No	Agitated, confused or drowsy
Oximetry on presentation (SaO <sub>2</sub> )**	>95%	<92%
Speech <sup>†</sup>	Sentences	Words
Pulse rate	<100 beats/minute	>180 beats/minute (0–3 years)
	012	>150 beats/minute (4–5 years)
Respiratory rate	≤40/minute	>40/minute
Central cyanosis	Absent	Likely to be present
Wheeze intensity	Variable	Chest may be quiet

\*Any of these features indicates a severe asthma exacerbation. \*\*Oximetry before treatment with oxygen or bronchodilator. \* The normal developmental capability of the child must be taken into account.



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NITIAr

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#### Adults, adolescents, children 6–11 years

#### MILD or MODERATE

Talks in phrases Prefers sitting to lying Not agitated Respiratory rate increased Accessory muscles not used Pulse rate 100–120 bpm O<sub>2</sub> saturation (on air) 90–95% PEF >50% predicted or best

#### SEVERE

Talks in words Sits hunched forwards Agitated Respiratory rate >30/min Accessory muscles being used Pulse rate >120 bpm  $O_2$  saturation (on air) < 90% PEF  $\leq$ 50% predicted or best



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Mod.

#### Severe

Inability to repeat a short phrase, extreme tachypnea, inspiratory and expiratory wheezing I:E ratio reduced severely very poor aeration significant use of accessory muscle SpO2 typically <92%

Mild

normal alertness slight tachypnea, expiratory wheezing only I:E ratio reduced minimal accessory muscle use SpO2 >95%

normal alertness Tachypnea wheezing throughout expiration with or without inspiratory wheezing I:E ratio reduced more significant use of accessory muscles SpO2 typically 92-95%



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#### UpToDate<sup>®</sup> Asthma exacerbation Assessment of Severity

#### Pulmonary Index Score (PIS)

Score	<b>Respiratory rate</b>			Inspiratory/	Accessory	Overeen
	<6 years old	≥6 years old	Wheezing	expiratory ratio	muscle use	saturation
0	≤30	≤20	None*	2:1	None	99 to 100
1	31 to 45	21 to 35	End expiration	1:1	+	96 to 98
2	46 to 60	36 to 50	Entire expiration	1:2	++	93 to 95
3*	>60	>50	Inspiration and expiration	1:3	+++	<93

\* A score of 3 is given for "wheezing" if there is no wheezing due to minimal air entry.

Mild : < 7 Moderate: 7 - 11 Severe: >= 12



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#### UpToDate<sup>®</sup> Asthma exacerbation Assessment of Severity

#### Pediatric respiratory assessment measure (PRAM)

					Severity classification	PRAM clinical score
Signs	Signs 0 1	1	2	3	Mild	0 to 4
Signs		•		5	Moderate	5 to 8
Suprasternal	Absent		Present		Severe	9 to 12
indrawing					Impending respiratory	12+
Scalene retractions	Absent		Present		failure	following lethargy, cyanosis, decreasing respiratory effort, and/or rising pCO2
Wheezing	Absent	Expiratory only	Inspiratory and expiratory	Audi steth ches mini	ble without hoscope/silent t with mal air entry	
Air entry	Normal	Decreased at bases	Widespread decrease	Absent/minimal		
Oxygen saturation on room air	>93%	90 to 93%	<90%			



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# **UpToDate**<sup>®</sup>

Acute asthma exacerbations in children younger than 12 years: Emergency department management

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#### Management of hypoxemia and hypercapnia

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## Management of bronchospasm



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#### Management of bronchospasm

#### Inhaled short-acting beta-2 agonists (SABA)



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#### Management of bronchospasm





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# Albuterol /Salbutamol/Ventolin Nebulizer vs MDI-VHC/S

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# Inhaled short-active is ta-2 agoint (SABA) Albuterol /Salbutamol/Ventolin Intermittent vs continuous

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# Management of bronc Dosage of MDI-VHC/S Albuterol /Salbutamol/Ventolin

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# **Dosage of MDI-VHC/S Albuterol /Salbutamol/Ventolin** 4-12 puffs (4-8 puffs) q 20 min for 3 doses then q 1-4 hour as needed



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# Dosage of Nebulization Albuterol /Salbutamol/Ventolin

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# **Dosage of Nebulization Albuterol /Salbutamol/Ventolin** Intermittent: 0.15mg/kg (Min: 2.5 mg / Max: 5mg)



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# **Dosage of Nebulization Albuterol /Salbutamol/Ventolin Continuous:** 5 - 10 kg → 5 - 7.5 mg/hour 10-20 kg → 10-12.5 mg/hour > 20 kg -> 15 - 20 mg/hour

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## Management of bronchospasm

# Inhaled short-acting beta-2 agonists (SABA) Ipratropium bromide





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## Management of bronch

## Ipratropium bromide

in Moderate-to-Severe cases



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## Management of bronch

## Ipratropium bromide



# Benefits?

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### Management of bronch

# Ipratropium bromide Nebulizer or Inhaler

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# Management of bronch DOSAGE? Inhaled short and and a second secon



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# Management of bronch Dosage? **Ipratropium bromide** Inhaler: 4-8 puffs/Dose (1-2puffs)



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### Management of bronchospasm



#### Magnesium sulfate



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NDC 51754-0

Magnesium

Injection, USP Strate of the second second For M or IV Use Must be Diluted before Will 19 ml, Single Dase Will

tx Oaly

Sulfate

## Management of bronch



## Indication?

#### **Magnesium sulfate**

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## Management of bronch



# Indication?

- Magnesium sulfate
- ✓ > 4 y and Severe

> 4 y and Mod. but not respond to initial Rx



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## Management of bronch



#### **Magnesium sulfate**

#### IV and Nebulizer



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## Management of broncl



# Dosage?

#### Magnesium sulfate

# IV: 25-75 (50) mg/kg → Max: 2 g

#### slow infusion in 20-60 min

Bolus of Fluid before administration



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## Management of broncl



# Dosage?

**Magnesium sulfate** 

## **Nebulizer:**

GINA: 150 mg – 3 doses in first hour of Rx for Severe cases of children >2 Y ????



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## Management of bronch



#### **Magnesium sulfate**

## \*Contraindicated in Renal Failure



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### Management of bronchospasm





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RI ONLY

#### Management of bronch Epinephrine Inhaled short-Terbutaline



Parenteral beta-agonists



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# Parenteral beta-agonists Indication? TERBUTALINE INJECTION ONLY Rx ONLY



## Management of bronch

Inhaled short-ac ing be a-2 agonists (SABA)
 Ipratropium biomide



Parenteral beta-agonists Indication?

Severe Cases with poor inspiratory flow Who can't cooperate with Neb. Rx (sever agitation)



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# **Parenteral beta-agonists** which Rout? IM / SC / IV TERBUTALINE INJECTION ONLY Rx ONLY



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## Dosage? Epinephrine IM/SC: 0.01 mg/kg Max: 0.4-0.5mg Terbutaline IM/SC: 0.01 mg/kg Max: 0.4-0.5mg



Parenteral beta-agonists

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#### **Management of Inflammation**





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#### Management of Inflam



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## Managewhich Rout?



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# Managen Doságe





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#### **Management of Inflammation**

Systemic glucocorticoids
Inhaled glucocorticoids

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# Other Therapies Leukotriene Receptor Antagonists (LTRA)

	10 mg	5	
A LANCE	ACTOLUKAS	ACTOLUKAST <sup>8</sup> 5	
Aur to	30 F.C. tablets Exch tablet cortains: Honteshaast (as sodium) 10mp	Montelukast	
	1	Monthe action of	



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#### Assess severity



#### Assess severity







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oDate®

#### Assess severity



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#### **Discharge to home after an exacerbation**

• Children who have marked improvement in clinical parameters within the first one to two hours of therapy may be discharged home.



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#### **Discharge to home after an exacerbation**

• Children who have **marked improvement** in clinical parameters within the first one to two hours of therapy may be discharged home.

Marked improvement is manifested by diminished or absent wheezing and retracting and increased aeration that is sustained at least 60 minutes after the most recent Salbutamol dose



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#### **Discharge to home after an exacerbation**

- Before discharge, the condition of the child should be stable (Should be out of bed and able to eat and drink without problems)
- family/careers should receive essential educations.
- A supply of SABA and, where applicable, the remainder of the course of oral corticosteroid, ICS or LTRA



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# **OCS after Discharge? Prednisolone:** 3-5 days 1mg/kg /day (max 30-50 mg) **Dexamethasone**??





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## **ICS after Discharge?**



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# Asthma exacerbation Assessment of Severity Follow Up

#### **Follow Up after an exacerbation**

• A follow-up appointment within one week and another within 1–2 months, depending on the clinical, social and practical context of the exacerbation.



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